Quality assurance in the management of peritonitis: A prospective study

CS Agrawal,[1] M Niranjan,[1] S Adhikary,[1] BS Karki,[2] R Pandey[3] and PR Chalise[4]

[1]Department of Surgery, [2]Department of Microbiology, [3]Department of Anesthesia, B P Koirala Institute of Health Sciences, Dharan, Nepal; [4]Department of Surgery, Nepal Medical College Teaching Hospital, Kathmandu, Nepal.

Corresponding author: Dr. Chandra Shekhar Agrawal**,** Department of Surgery, B P Koirala Institute of Health Sciences, Dharan, Nepal; e-mail: drcsagrawal@yahoo.com

ABSTRACT

The aim of this study was to assess the quality of care indicators in the management of peritonitis. A total of 124 cases with diagnosis of secondary and tertiary peritonitis were included. Detailed clinical history, examination, relevant investigations and details of operative findings were noted. The following quality indicators–surgical consultation time, waiting period for surgery, diagnostic accuracy, antibiotic utilization pattern, morbidity, mortality, length of hospital stay, and accessibility of service to patients were assessed. The mean age of patient was 37.4 years with male to female ratio of 4.4:1. More than half of the patients (51.6%) surgical consultation time was less than half an hour. Majority of patients (67.7%) were operated only after 6 hours. Duodenal ulcer perforation was the commonest etiology for peritonitis and the clinical diagnostic accuracy was 97.3%. The commonest bacteria isolated from peritoneal fluid culture was E.coli which was sensitive to Amikacin mostly. The overall morbidities were seen in 20.1% of patients and burst abdomen was the leading complication. A total of 8 patients (6.4%) died in this study and when Mannheim's peritonitis index (MPI) score was compared, score of more than 26 was found to be a significant predictor of mortality ($p<0.0001$). Most of the patients after reaching the tertiary care hospital were managed satisfactorily. Though there are lots of parameters that still need to be improved.

Keywords: Management, peritonitis, quality assurance, quality care.

INTRODUCTION

Quality is not a new term – in some ways all professionals have been using quality parameters to monitor and improve their performance. However, its application in the health field in a systemized manner is comparatively new. There are different perspectives to quality in health care - to the provider it means best possible care of the patients; to the manager it means providing effective care in a cost-effective manner; and to the client it means receiving best care when he wants, where he wants and in the quickest possible time. Thus, most commonly used definition of quality in health is – "it is care that is needed and delivered in a manner that is competent, caring, cost-effective and timely; it minimizes risks and achieves achievable benefits".[1]

Quality assurance is the oldest and most familiar form of quality improvement. It involves assessing care that has already been provided and taking action to improve it in the future. This is done by identifying problems in health care delivery, analyzing them, and seeking to solve them.[2]

All quality assurance approaches share one common theme: the measurement of actual performance, and its comparison with either expected or normative performance (standards), or the implementation of changes to improve the delivery of health services, and consequently of health status.[2] Quality emergency care is an important indicator of the performance of any hospital; it involves provision of optimum and appropriate treatment to acutely ill patients without any delay. Management of emergency patients involves urgent decision making, often based on limited clinical information. The patients have a rightful expectation for competent, caring, cost-effective and timely treatment. Any gap between the patient's expectation and the actual service provided causes dissatisfaction and complaints. It may be worthwhile to start quality assurance in surgical emergency services provided to patients.

Surgical treatment of peritonitis is highly demanding, complex and sometime controversial.[3] Despite improved diagnostic modalities, potent antibiotics, modern intensive care and aggressive surgical intervention; outcome of peritonitis is still poor.[4] So the present study was done to assure quality of care in the management of peritonitis.

MATERIALS AND METHODS

This prospective clinical study was conducted in B.P Koirala Institute of Health Sciences, during a period of one year from January 2001 to January 2002. A total of 124 cases were included in the study. Patients with a

Table-1: Surgical consultation time

Time (Hours)	Number of patients	%
<1/2	64	51.6
½ - 1	26	20.9
1-2	21	16.9
2-4	8	6.4
>4	5	4.0
Total	**124**	**100.0**

clinical diagnosis of secondary and tertiary peritonitis irrespective of age and sex group were considered for this study.

A detailed clinical history, examination and relevant investigations (including hemoglobin, blood sugar, blood urea, serum creatinine, serum amylase, ECG, chest X-ray, abdominal X-ray etc.) were carried out. The operating decision was taken by the senior resident / consultant on duty. Operation was performed through a midline exploratory laparotomy incision. Peritoneal fluid was sent for culture and sensitivity. Intra-operative findings (nature of exudates- clear, purulent, fecal, and origin of source of infection etc.) were recorded. The sources of infection were eliminated. Purulent exudates, fecal debris, food particles, and blood were aspirated. Pelvic regions, paracolic gutters and subphrenic spaces were opened and debrided. Intra-operative peritoneal lavage was done adequately with normal saline. Lavage fluid was completely aspirated. Appropriate numbers of abdominal drains were inserted according to the site of origin of infection and severity of peritonitis. Abdomen was closed in layers. All specimen / organ removed were sent for histopathological examination. All cases were kept on nasogastric suction and intravenous fluids. Intravenous ciprofloxacin (10 mg/Kg body weight /day in 2 divided doses) and metronidazole (15 mg/Kg body weight stat followed by 7.5 mg/Kg body weight every 8 hourly) were infused initially and later switched to oral medication. Antibiotics were changed subsequently according to peritoneal fluid culture and sensitivity reports. Outcome of peritonitis was predicted by Mannheim peritonitis index.[5] Postoperative follow up was done clinically; however relevant investigations were done as desired.

Table-2: Etiology of peritonitis

Etiology	Number of patients	%
Duodenal ulcer perforation	46	37.1
Appendicular perforation	32	25.8
Blunt trauma abdomen	16	12.9
Penetrating injury	7	5.6
Tubercular stricture perforation	7	5.6
Gastric perforation	5	4.0
Enteric perforation	4	3.2
Colonic perforation	3	2.4
Strangulated hernia	2	1.6
Non specific cause	2	1.6
Total	124	100.0

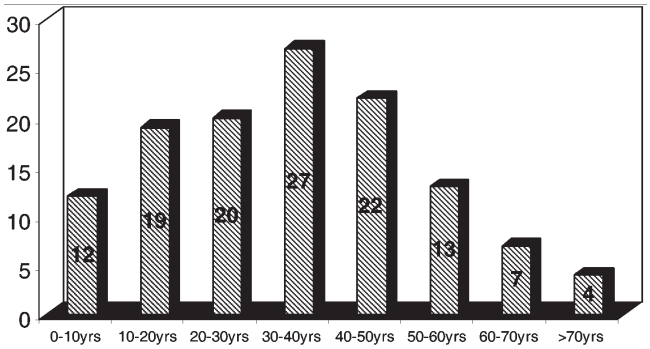

Fig.1. Age Distribution

The following quality indicators –surgical consultation time, waiting period for surgery, diagnostic accuracy, antibiotic utilization pattern, morbidity, mortality, length of hospital stay, and accessibility of service to patients were assessed in this study.

Data from filled Performa was entered in a computer and analyzed using the statistical package for social sciences (SPSS) for Windows.

RESULTS

A total of 124 patients with diagnosis of secondary and tertiary peritonitis were included in this study. The mean age of patients was 37.4 years ranging from 2 to 76 years and majority of patients (21.7%) belonged to age group of 30-40 years (Fig. 1). There was male preponderance (81.4%) with male to female ration of 4.4:1. Majority of the patients (89; 71.7%) presented after 24 hours of onset of symptoms.

Surgical Consultation time: For more than half of the patients (51.6%) surgical consultation time, which is calculated as the time elapsed between the recorded arrival time to emergency and time at which the patient

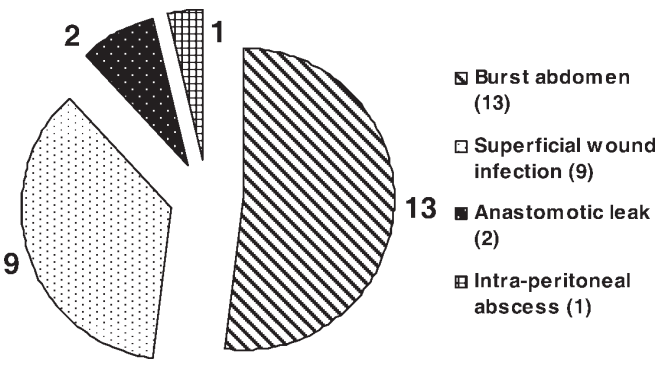

Fig.2. Morbidities

Table-3: Organism grown in peritoneal fluid and antibiotic sensitivity pattern (n=96)

Organism	Total number	%	Amikacin		Gentamycin		Ofloxacin		Ciprofloxacin	
			n	%	n	%	n	%	n	%
E. coli	18	18.75	13	72.2	2	11.1	2	11.1	1	5.5
Enterococci	6	6.25	1	16.6	3	50.0	0	0	2	33.3
Klebsiella	2	2.08	2	100.0	0	0	0	0	0	0
Acinetobacter	1	1.04	1	100.0	0	0	0	0	0	0
Citrobacter	1	1.04	1	100.0	0	0	0	0	0	0
Streptococci	1	1.04	0	0	1	100.0	0	0	0	0
No growth	67	69.79								

was first seen by surgical team, was less than half an hour. A few patients (4.0%) were attended even after 4 hours of arrival (Table-1).

Waiting period for surgery: Waiting period for surgery, which is defined as time between surgical consultation and operative procedure, was less than 6 hrs in 40 patients (32.2%). Remaining patients (67.7%) were operated after 6 hours. The commonest reason for delay was problems attributed to the patient's relative (32.25%) followed by engagement of anesthetists in another operation (14.5%) and non-availability of operating room (8.9%).

Etiology of Peritonitis: Duodenal ulcer perforation (37.1%) was the most common cause (Table-2) followed by appendicular perforation (25.85%) and blunt trauma abdomen (12.9%).

Diagnostic accuracy of peritonitis: Overall clinical diagnostic accuracy for peritonitis was 97.3%.

Peritoneal fluid culture and antibiotic sensitivity pattern: Peritoneal fluid culture was done in 96 patients (77.4%) only. It was sterile in 67 patients (69.8%). Commonest organism isolated was E. coli (18.7%), followed by Enterococci and Klebsiella (Table-3). Most of the organism (62.0%) was sensitive to Amikacin followed by Gentamycin (20.6%), Ciprofloxacin (10.3%) and Ofloxacin (6.9%).

Morbidity: The overall morbidities were seen in 25 patients (20.1%). Burst abdomen (10.5%) was the leading complication followed by superficial wound infection and anastomotic leak (Fig.2).

Mortality: A total of 8 patients died in this study, so the overall mortality rate was 6.4%. When mortality was compared in between various age groups, no statistical significance was observed (p=0.37). Similarly mortality was not related to duration of symptoms (p=0.81), surgical consultation time (p=0.78) and waiting period for surgery (p=0.94). When Mannheim's peritonitis index (MPI) score was compared (Table-4), score of more than 26 was found to be a significant predictor of mortality (p<0.0001). The sensitivity, specificity and accuracy of MPI score were 37.5%, 98.3% and 94.3% respectively to predict the mortality.

Length of hospital stay: The average length of hospital stay (for both survivors and non survivors) was 8.2 days ranging from 3 to 41 days.

Accessibility of services to the patients: In this study, we found that treatment is accessible to majority of the patients. However, in few cases treatment was delayed even for 48 hours. The reason for delay was attributed to patient's relatives as they took time to arrange the money for treatment.

DISCUSSION

Peritonitis remains a hot spot for the surgeons despite advancements in surgical technique and intensive care treatment. Various factors like age, sex, duration, site of perforation, extent of peritonitis and delay in surgical intervention are associated with morbidity and mortality. A successful outcome depends upon early surgical intervention, source control and exclusive intraoperative peritoneal lavage.

The dictum still holds true that no age is exempted form peritonitis to occur. We came across from the age of 2 to 76 years; maximum numbers belonged to age group of 30-40 years. Various series have reported that peritonitis was more common in second and third decade of life.[6,7] Male patient was four times more common than female while other series have claimed that male to female ratio of 2-3:1.[8,9] Majority of patients in our series reported late to our tertiary care hospital;

Table-4: Mannheim's peritonitis index score and mortality

MPI score	Number of Patients	Mortality	Mortality %	Mean score (Range)	p Value
<26	119	5	4.2	19.71 (10-25)	<0.0001
>26	5	3	60.0	29.4 (27-32)	

Mannheim peritonitis index

Risk factors		Scores
Age>50 years		5
Sex: Female		5
Organ failure*		7
Malignancy		4
Preoperative duration of peritonitis >24 hours		4
Origin of sepsis not colonic		4
Diffuse generalized peritonitis		6
Exudates:	Clear	0
	Cloudy, Purulent	6
	Fecal	12
Total		**53**

***Organ failure is defined as below:**

Kidney:	Creatinine - >2 mg%
	Urea - >100 mg%
	Oliguria: <20 ml/hours
Lung:	pO_2 - <50 mm Hg
	pCO_2 - >50 mm Hg
Shock:	Hyper dynamic or hypo dynamic
Intestinal obstruction:	Paralysis - >24 hrs or complete mechanical ileus

which could be due to poor transport mechanism. Most of our patients resides in the rural hilly areas, seek medical attention in the near by health centers and then only referred to our centre.

Time taken for surgical consultation is one of the parameters of quality care. In our study more than half of patients were attended within half an hour and only few patients (4.0%) were seen after 4 hours. Reasons for those delays could be due to engagement of surgical team in another life saving emergency operation or the diagnostic dilemma faced by the attending medical officers.

Waiting period for surgery is another important quality parameter as intervention should never be delayed by more than few hours. Ideally surgical intervention should be done within 6 hours.[10] This is the period in which all the investigative and resuscitative measures should be carried out. In our series majority of patients (67.7%) underwent surgical intervention after 6 hours; most of the time this delay was attributed to the patient's relative as all the expenses in our health care system need to be deposited by patient's party. Part of this delay was also attributed to busy anesthetist and occupied operating rooms. Various series have also reported delay during managing a case of peritonitis and reasons forwarded are diagnostic dilemma and time taken for resuscitations.[11,12]

In our study the most common etiology of peritonitis was duodenal ulcer perforation (37.09%) followed by appendicular perforation and blunt trauma abdomen. Ohmann *et al*.[13] reported duodenal ulcer perforation as the commonest cause for peritonitis in his series while Kachroo *et al*.[14] found appendicular perforation as the commonest cause. The overall diagnostic accuracy for peritonitis was 97.3% while in another study done by Wroblewski *et al*.[15] diagnostic accuracy was only 47.0%; though that study was conducted on geriatric population.

Peritoneal fluid culture reveals E. coli as the most common pathogen in our study. Similar results were published by "National foundation for infectious disease" and study entitled "management of community acquired peritonitis".[16] Amikacin was the most sensitive drug against the bacteria. Although we'd used intravenous ciprofloxacin and metronidazole as a first line drugs, in 23.3% of patients we need to change the drugs to Amikacin after culture and sensitivity reports. Various studies have compared the efficacy of clindamycin and aminoglycoside, aminoglycoside and metronidazole or a third generation cephalosporin and metronidazole combinations and found to have an equal efficacy to the drug combination that we'd used. All above mentioned combination increase the cost as compared to ciprofloxacin and metronidazole combination which is relatively cheaper.

Morbidity in terms of post operative complications is another important parameter of quality care. In our series morbidity was observed in 20.1% of patients which is lower than those reported series by Hunt[17] (23.0%) and Brugger *et al*.[18] (39.0%). Burst abdomen was the leading complication (10.5%) and it was high as compared to another series by Harold Ellis[19] where he reported it to be 3.0%. Hence, in future, this point need to be considered and more effective closure technique should be used to prevent it. The incidence of superficial wound infection (7.2%) was comparable to a study done by Shurkalin *et al*.[20]

A total of 8 patients die during our study period and overall mortality was calculated to be 6.45%. This is comparable to mortality observed in the study done by Lee *et al*.[21] (7.8%) and Demmel *et al*.[22] (6.8%). We also tried to analyze the mortality parameter in relation to age, duration of peritonitis, time taken for surgical consultation, waiting period for surgical intervention and etiology of peritonitis; but failed to demonstrate the statistically significant relationship. There was no mortality in duodenal ulcer perforation and appendicular perforation group. Prediction of outcome was done by MPI scoring system and score more than 26 was a significant predictor of mortality. Billing *et al*.[23] found

mortality of 3.0-10.0% in patients with MPI score of <26 and 44-81% in patients with MPI score of >26. Similarly in study by Linder et al.[24] mortality in those two groups were 5.6% and 56.7% respectively. Thus this information can be used to predict the outcome of peritonitis patients before intervention.

To conclude, the present study assessed the quality of care in the management of peritonitis and showed that most of the patients after reaching the tertiary care hospital were managed satisfactorily. Though there are lots of parameters that still need to be improved.

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